



SAFETY INVESTIGATION REPORT

201709/013

REPORT NO.: 17/2018

September 2018

The Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011 prescribe that the sole objective of marine safety investigations carried out in accordance with the regulations, including analysis, conclusions, and recommendations, which either result from them or are part of the process thereof, shall be the prevention of future marine accidents and incidents through the ascertainment of causes, contributing factors and circumstances.

Moreover, it is not the purpose of marine safety investigations carried out in accordance with these regulations to apportion blame or determine civil and criminal liabilities.

NOTE

This report is not written with litigation in mind and pursuant to Regulation 13(7) of the Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011, shall be inadmissible in any judicial proceedings whose purpose or one of whose purposes is to attribute or apportion liability or blame, unless, under prescribed conditions, a Court determines otherwise.

The report may therefore be misleading if used for purposes other than the promulgation of safety lessons.

© Copyright TM, 2018.

This document/publication (excluding the logos) may be re-used free of charge in any format or medium for education purposes. It may be only re-used accurately and not in a misleading context. The material must be acknowledged as TM copyright.

The document/publication shall be cited and properly referenced. Where the MSIU would have identified any third party copyright, permission must be obtained from the copyright holders concerned.

MV APL CORAL Serious injury to a crew member Approximately 250 nautical miles off Shekou 09 September 2017

SUMMARY

At about 0700 (LT), on 09 September 2017, the second engineer officer on board *APL Coral* slipped and fell from a height of 5.5 m in the engine-room while carrying out emergency repairs on the main engine. Consequently, he was seriously injured.

The MSIU found that at the time of the fall, the second engineer was squatting on a small, slippery platform, trying to close the valves on the fuel pump of the main engine's no. 10 unit. Consequently, he lost his balance and fell backwards to the next platform, about 2.5 m

down, went through the horizontal guardrail and then fell another 3.0 m to the bottom platform. The second officer was eventually evacuated from the vessel.

The safety investigation revealed that the crew member, was using a makeshift tool, and was neither wearing his safety helmet nor a safety harness.

Taking into consideration the safety actions taken by the Company, the MSIU has not made any recommendations.



APL Coral

FACTUAL INFORMATION

The vessel

APL Coral, was a Maltese-registered¹ container ship of 65,475 GT. She was built in the Republic of Korea in 1998 by Samsung Heavy Industries. The vessel's registered owner was Wilmington Trust Company, managed by APL Maritime Ltd. and classed by American Bureau of Shipping (ABS).

The vessel's length overall was 275.20 m, with a breadth of 40.0 m and a deadweight of 64,145 tonnes. *APL Coral* was fully cellular and was powered by one 12RTA84C Sulzer two-stroke, 12-cylinder diesel engine, producing 48,635 kW at 102 rpm. This drove a single fixed-pitch propeller, with a service speed of 24.5 knots.

At the time of the accident, *APL Coral* was on a coastal voyage from Ningbo, China to the Port of Shekou, also in China.

Crew

APL Coral's Minimum Safe Manning Certificate required a crew of 15. There were 21 crew members at the time of the accident. The crew members were from Romania, Bulgaria and Sri Lanka.

The injured second engineer was a Bulgarian national and was 56 years old. He had a total of 22 years of seagoing experience. He obtained his chief engineer's Certificate of Competence in 2011 but had been sailing as a second engineer for the last 10 years. He was employed as a second engineer by the present Company for 10 months in 2012/13 and again this time when he joined *APL Coral* in June 2017.

The working language on board was English.

¹ The vessel was deleted from the Maltese Register on 10 October 2017.

Weather Conditions

At the time of the accident, the weather was reported to be clear. The sea state was 3, with a 1.0 m swell and a Southeasterly gentle breeze. The air temperature was 30 °C.

Narrative²

On 07 September 2017, *APL Coral* departed from Ningbo, China, for the Port of Shekou, China.

The voyage was uneventful until the early morning of 09 September when the duty engineer was alerted to a leakage from the high pressure inlet pipe on no. 10 cylinder fuel injector pump. The chief engineer was immediately informed.

Given that this leakage was resulting in the spraying of fuel onto the main engine and its surroundings, thereby causing a fire hazard, the chief engineer immediately informed the bridge that the main engine had to be stopped in order to attend to this problem. At around 0600, the main engine was stopped and the vessel started drifting.

As soon as the main engine was stopped, the chief engineer and his team of engineers, who by then were all called to the engine-room, proceeded to repair the leaking pipe. Once the repairs were completed, the main engine was restarted. However, it was observed that the repairs were unsuccessful as the leak persisted.

The main engine was stopped again in order to try and repair the leak for a second time. At this time, when the main engine came to a complete stop, it was noticed that the camshaft position was in a position which left no. 10 cylinder in a bottom dead centre position. In order to rectify this problem, it was necessary to manually close the inlet/outlet valve for the main engine fuel pump unit no. 10, which was in the open position.

² Unless otherwise stated, all times are local (LT).

At this time, the chief engineer, who together with the rest of the team, were all on the top platform, instructed the second and third engineers to go down to the main engine's middle platform area where the main engine fuel pump was located and manually close the inlet/outlet valve.

While the second engineer proceeded to the middle platform, the third engineer made his way to the engine-room workshop to get the 'special tool' for this job. This consisted of a sawn-off ring-spanner, specially cut in half (thereby shortened in length) to close/open the said valve. The adaptation to the tool was necessary since the space around was restricted by the platform.

When the third engineer returned to the middle platform with the sawn-off ring spanner, he handed over the spanner to the second engineer and both climbed up to the platform adjacent to the fuel pumps. There were three fuel pumps next to this platform.

In order to gain access, the second engineer had to squat and adopt this position to use the ring spanner on the valve on the fuel pump for no. 10 cylinder. In the meantime, the third engineer, who had also climbed up after the second engineer (Figure 1), positioned himself next to the second engineer, but stood up on top of a pipe guard, which ran along the main engine casing.

In the meantime, the second engineer proceeded to use the ring spanner on the valve in order to close it. At one point in time, the ring spanner slipped out of the valve and consequently, the second engineer lost his balance, fell backwards, through the space between the middle guardrail and the toe board, onto the middle platform, approximately 2.5 m below. The second engineer then bounced, rolled and went through the horizontal guardrails of the middle platform and fell again another 3.0 m, until he landed on the main engine bottom platform (Figure 2).



Figure 1: Platform where the second and third engineers were standing



Figure 2: The middle platform and the bottom platform where the second engineer finally landed

Post-accident events

Following the fall, the second engineer remained semi-conscious on the bottom platform until help arrived. The third engineer was the first to reach him, followed by the chief engineer and the oilers.

The chief engineer and his team slowly transferred the injured crew member to the engine control room. The bridge and the master were then informed of the accident. First aid was administered and the master contacted the Great Western Hospital for medical advice.

Eventually, the second engineer was transferred to his cabin to rest until the vessel arrived at the port of Shekou, where he was seen by a doctor before he was transferred to the local hospital.

Sustained injuries

At the hospital, the second engineer was diagnosed with various fractures, including a number of ribs, the left radius, left styloid process of ulna, carpal bones and scapula. He also suffered from a contusion and pleural effusion in both lungs.

ANALYSIS

Aim

The purpose of a marine safety investigation is to determine the circumstances and safety factors of the accident as a basis for making recommendations, and to prevent further marine casualties or incidents from occurring in the future.

Effects of the weather conditions on the vessel

The vessel's motion in the prevailing weather conditions was reported to be negligible and, therefore, the environmental conditions were not considered to be a contributing factor to the accident.

Health and safety – working aloft

Working Aloft was addressed in the Shipboard Safety Management Manual – Document No. 06.01.047 'Work Permits'. This document covered, amongst other areas, 'Permit to Work Aloft – Form S126'. It is stated that a risk assessment must be carried out whenever the job involves 'hazards'. Furthermore, a 'Work Permit' must be issued after completion of the relevant checklist.

The situation during the early hours of 09 September in the engine-room was a dangerous one. A leakage developed on one of the high pressure fuel lines, spraying hot fuel on the main engine and nearby machinery. This is one of the most common causes of fires in engine-rooms. Repairs necessitated that the main engine is stopped, thereby resulting in 'time lost' for the vessel.

It would appear that when the chief engineer was alerted to this problem, his priority at the time was, understandably, the elimination of the dangerous situation that had developed by first shutting down the main engine and then fixing the problem as soon as possible. Hence, no risk assessment was made, no checklists were completed and no Work Permits issued.

Both the second and third engineers had climbed up above the main engine middle platform to a position where there was a small platform (75 cm x 30 cm), complete with two stanchions. The positions where the two engineers stayed were slippery and covered in oil from the leaking high-pressure hose. Furthermore, the safety investigation did not have evidence to suggest that the two engineers were wearing their safety helmets and fall preventers at any time during the work which they were carrying out.

By adopting a squatting position, the chief engineer's centre of gravity was shifted towards the edge of the platform. The adapted ring-spanner, with a shorter lever (Figure 2), would have reduced the grip exerted on the spanner.



Figure 2: The adapted spanner used by the chief engineer

A jolt by the crew member, especially if either the grip slipped or the spanner itself slipped from the valve's nut, would have been enough to imbalance the crew member from the small platform. Moreover, the third engineer was unable to do anything to prevent the fall because even he was standing in a dangerous position and would have lost his balance and fall to the middle platform.

Fitted guardrails

IMO and IACS regulations require that platform guardrails are one metre in height, with one middle guardrail and a toe board. This makes the gap / distance between the middle guardrail and the bottom plate of the platforms approximately 0.5 m in height. The safety investigation concluded that the guardrails around the middle platform (Figure 3) were in accordance with these requirements.

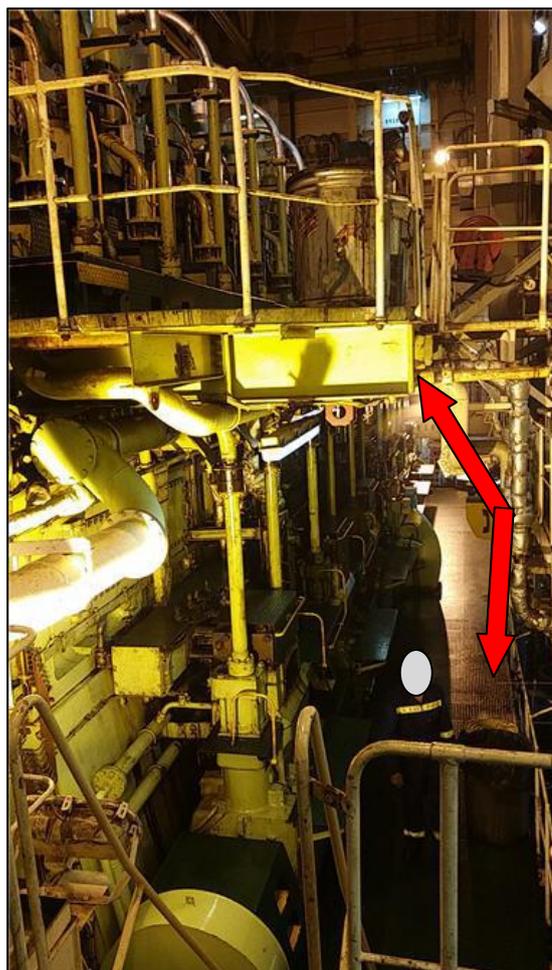


Figure 3: Top and middle platforms

Safety concerns

Although over the years, the Marine Safety Investigation Unit has received a number of notifications of falls from heights on board vessels, falls in engine-rooms are less frequently reported.

Data of accidents involving falls from heights on board ships, whether in the engine-room or on deck, suggests a number of common factors, including:

- unrecognised hazards; and
- appropriate safety equipment not used.

In this case, the combination of using a modified tool, a slippery platform and lack of use of the safety harness were considered as the main contributing factors to the accident.

The safety investigation identified two possible causes to this approach:

- a trade-off in the sense that it would have saved time; and / or
- the procedure may have already been carried out on a number of occasions without an accident.

The safety investigation found that prior to the commencement of the required repairs, no risk assessment was carried out, no checklist was completed, and no 'Work Permit' was issued. The safety investigation believes that the safety procedures were not complied with because of the urgency of the repairs and the fire hazard that the leaking high pressure line was causing.

It has to be highlighted that the area lacked adequate, artificial lighting. The same area was also very slippery with the oil that leaked from the high pressure line.

CONCLUSIONS

1. The positions where the two engineers stayed were slippery and covered in oil from the leaking high-pressure hose;
2. The two engineers were not wearing personal protective equipment at any time during the work which they were carrying out;
3. By adopting a squatting position, the chief engineer's centre of gravity was shifted towards the edge of the platform;
4. The adapted ring-spanner, with a shorter lever would have reduced the grip exerted on the spanner;
5. A jolt by the crew member, especially if either the grip slipped, or the spanner itself slipped from the valve's nut, would have been enough to imbalance the crew member from the small platform;

6. The safety investigation believes that the safety procedures were not complied with because of the urgency of the repairs and the fire hazard that the leaking high pressure line was creating;
7. The area lacked adequate, artificial lighting.

SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION³

Following the accident, the Company adopted a number of safety actions with the aim of preventing similar future accidents. These included instructions to ensure that:

- a risk assessment is always carried out in order to identify hazards;
- safety gear is used at all times;
- adequate housekeeping is maintained at all times;
- 'non-standard tools' are removed and only standard tools are used;
- engineers are retrained in the proper use of safety gear and the right tools for the right jobs;
- considerations are made for the fabrication of a proper platform below the main engine fuel pump unit in order to have easy access to the inlet/outlet valves; and
- a vertical round bar is fabricated to divide the railings into smaller sections.

RECOMMENDATIONS

In view of the safety actions taken by the Company, no safety recommendations were made.

³ **Safety actions shall not create a presumption of blame and / or liability.**

SHIP PARTICULARS

Vessel Name:	<i>APL Coral</i>
Flag:	Malta*
Classification Society:	American Bureau of Shipping (ABS)
IMO Number:	9139749
Type:	Container
Registered Owner:	Nol Liner Pte Ltd.
Managers:	APL Maritime Ltd.
Construction:	Steel
Length Overall:	275.20 m
Registered Length:	261.3 m
Gross Tonnage:	65,475
Minimum Safe Manning:	15
Authorised Cargo:	Containerised cargo

VOYAGE PARTICULARS

Port of Departure:	Ningbo, China
Port of Arrival:	Shekou, China
Type of Voyage:	Short International
Cargo Information:	Unspecified quantity of TEUs
Manning:	21

MARINE OCCURRENCE INFORMATION

Date and Time:	09 September 2017 at 0700 (LT)
Classification of Occurrence:	Serious Marine Casualty
Location of Occurrence:	About 225 nautical miles off Shekou
Place on Board	Engine-room
Injuries / Fatalities:	One injury
Damage / Environmental Impact:	None reported
Ship Operation:	In passage
Voyage Segment:	Transit
External & Internal Environment:	The weather was reported to be clear. The sea state was 3 with a 1.0 m swell and a Southeasterly gentle breeze. The air temperature was 30 °C. Poor artificial lighting in the area was observed.
Persons on board:	21

* The vessel has been deleted from the Maltese Register of Ships on 10 October 2017.